

CLAIMS

What is claimed is:

1. A belt polish module comprising:

a first roller;

a linear CMP belt forming a continuous loop around the first roller;

a first piston engaging a first end of the first roller and effective to apply a

variable force to the first end of the first roller; and

a control mechanism configured to vary the variable force applied by the first

piston to the first end of the first roller in order to laterally translate the

linear CMP belt.

2. The belt polish module of claim 1 wherein the first roller is an idle roller.

3. The belt polish module of claim 1 wherein the first roller is a drive roller for

translating the linear CMP belt in a longitudinal direction.

4. The belt polish module of claim 1 further comprising a second piston engaging a

second end of the first roller and effective to apply a variable force to the second

end of the first roller.

5. The belt polish module of claim 4 wherein the control mechanism is further configured to coordinate the variable forces applied by the first and second pistons to the respective ends of the first roller in order to laterally translate the linear CMP belt.
6. The belt polish module of claim 4 wherein the control mechanism includes a first controller configured to vary the variable force applied by the first piston and a second controller configured to vary the variable force applied by the second piston.
7. A belt polish module comprising:
 - a linear CMP belt forming a continuous loop around an idle roller and a drive roller for translating the linear CMP belt in a longitudinal direction;
 - first and second pistons engaging, respectively, first and second ends of the idle roller, each piston being effective to apply a variable force to the respective end of the idle roller; and
 - a control mechanism configured to vary the variable forces applied by the first and second pistons to their respective ends of the idle roller in order to laterally translate the linear CMP belt.
8. The belt polish module of claim 7 wherein the control mechanism includes a belt position sensor for determining a position of the linear CMP belt.

9. The belt polish module of claim 8 wherein the control mechanism is further configured to control the first and second pistons according to a signal from the belt position sensor.
10. The belt polish module of claim 7 wherein the control mechanism is further configured to vary the variable forces applied to the first and second pistons by modulating the variable forces.
11. The belt polish module of claim 7 wherein the control mechanism is further configured to maintain a phase difference between the variable forces applied by the first and second pistons.
12. The belt polish module of claim 7 wherein the control mechanism is further configured to vary the variable forces applied by the first and second pistons according to a waveform.
13. The belt polish module of claim 12 wherein the waveform is a triangle wave.

14. A linear belt CMP system comprising:

 - a rotatable wafer chuck configured to secure a wafer for rotation about a vertical axis; and
 - a belt polish module comprising

 - a linear CMP belt forming a continuous loop around a drive roller and an idle roller for translating the linear CMP belt in a longitudinal direction,
 - first and second pistons engaging, respectively, first and second ends of the idle roller, each piston effective to apply a variable force to the respective end of the idle roller, and
 - a control mechanism configured to vary the force applied by the first and second pistons to their respective ends of the idle roller in order to laterally translate the linear CMP belt in an oscillatory manner.
15. The linear belt CMP system of claim 14 wherein the control mechanism includes a belt position sensor for determining a position of the linear CMP belt.
16. The linear belt CMP system of claim 15 wherein the control mechanism is further configured to control the first and second pistons according to a signal from the belt position sensor.

17. The linear belt CMP system of claim 14 wherein the control mechanism is further configured to vary the variable forces applied to the first and second pistons by modulating the variable forces.
18. The linear belt CMP system of claim 14 wherein the control mechanism is further configured to maintain a phase difference between the variable forces applied by the first and second pistons.
19. The linear belt CMP system of claim 14 wherein the control mechanism is further configured to vary the variable forces applied by the first and second pistons according to a waveform.
20. The linear belt CMP system of claim 14 wherein the control mechanism is further configured to coordinate the variable forces applied by the first and second pistons to the respective ends of the idle roller.

21. A linear belt CMP system comprising:
 - a rotatable wafer chuck configured to secure a wafer for rotation about a vertical axis; and
 - a belt polish module comprising
 - a linear CMP belt forming a continuous loop and configured to be translated in a longitudinal direction, and
 - means for causing an oscillatory relative lateral motion between the CMP belt and the rotatable wafer chuck.
22. A method for linear CMP of a wafer comprising:
 - rotating the wafer about a vertical axis;
 - contacting the rotating wafer against a linear CMP belt moving in a longitudinal direction relative to the vertical axis; and
 - causing a relative lateral motion between the rotating wafer and the linear CMP belt.
23. The method of claim 22 wherein causing the relative lateral motion includes oscillating the linear CMP belt in a lateral direction.
24. The method of claim 23 wherein oscillating the linear CMP belt includes oscillating the linear CMP belt by a small multiple of a groove pitch of the linear CMP belt.

25. The method of claim 23 wherein oscillating the linear CMP belt includes oscillating the linear CMP belt by an integer number of oscillations within a polish time of the wafer.

26. The method of claim 23 wherein oscillating the linear CMP belt includes translating the linear CMP belt at an approximately constant rate between ends of travel.